

ISA Virus Spread by Red Blood Cells in the Blood Vessels

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NORWAY - New research sheds light on how the interaction between salmon and the Infectious Salmon Anaemia (ISA) virus develops and spreads in fish. The findings may also be of interest for influenza research in general.

ISA was first discovered in Norway in 1984 and is still a serious threat to aquaculture. Disease outbreaks usually start in one cage and spread gradually over weeks and months to neighbouring cages. The disease can not be treated, causing large losses. The disease must also be reported to the OIE.

Maria Aamelfot has, as part of her doctorate, studied the disease. She has examined the cells in the fish that are susceptible to the virus and those which are actually infected with the virus. Her findings also describe the virus's ability to infect or damage to specific cells, tissues or organs.

Ms Aamelfot's research on the interaction between salmon and viruses provides important new information about the development of ISA and represents an important step towards knowledge in disease prevention.

Virus and receptor = key in the lock

Ms Aamelfot has developed a method that shows how the cells and organs of the virus can attach as a route of infection.

For a virus to infect a cell, the cell must have the specific virus receptor on the surface. Different viruses use their specific receptors, and virus binding to these fit like a key in a lock.

ISA virus receptors found on cells in the salmon include: the endothelial cells that line the inside of blood vessels, the red blood cells in the blood vessels and the cells that line the outside of the gills.

This is the first time someone has visualised this receptor in tissue sections and shown where it is at the cellular level. Ms Aamelfot compared this with cells from ISA infected salmon and found a clear correlation.

Viruses that multiply in endothelial cells are secreted directly into the bloodstream and attach to the red blood cells that transport the virus around the blood vessel system.

Red blood cells that are covered with virus appear to be damaged, and contribute to the circulatory disturbances that characterise the symptoms in ISA infected salmon.

Endothelial cells have several important functions for circulation and defense against infections. The defense mechanisms may be impaired if these cells are damaged.

The inside of the veins are covered by a "cloud" of carbohydrate chains which have protective function and when damaged the resistance against infections is lowered. Ms Aamelfot has shown how a structure in this carbohydrate "cloud", a sialic acid kind of a molecule, is distributed in the fish at the cellular level.

This version of the sialic acid molecule is probably important for good blood flow and aiding protection.

Doctoral work was performed at the Norwegian Veterinary Institute.

Researchers, graduate students and engineers at the Norwegian Veterinary Institute and the Norwegian Veterinary College have been key partners.

<http://tinyurl.com/cyr3q9p>